STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	TOTAL SHEETS
	029 S-168	1	19

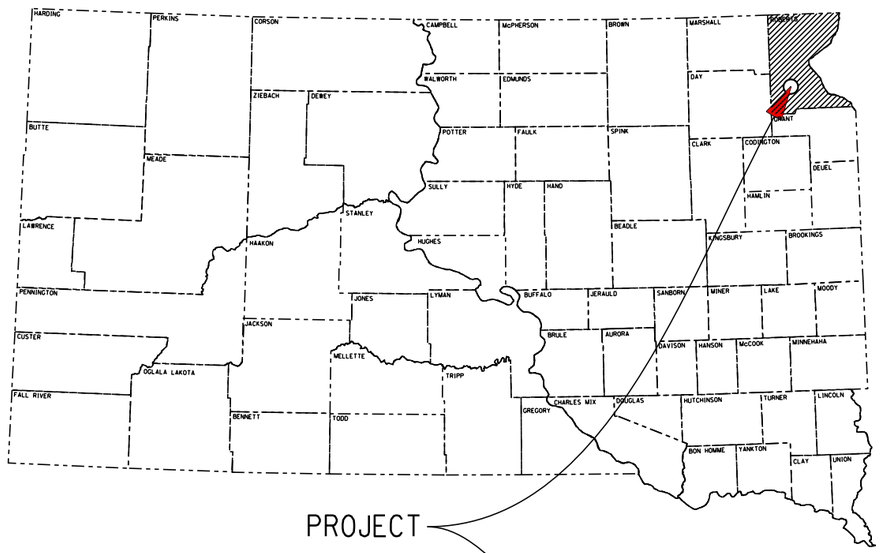
Plotting Date: 03/23/2020

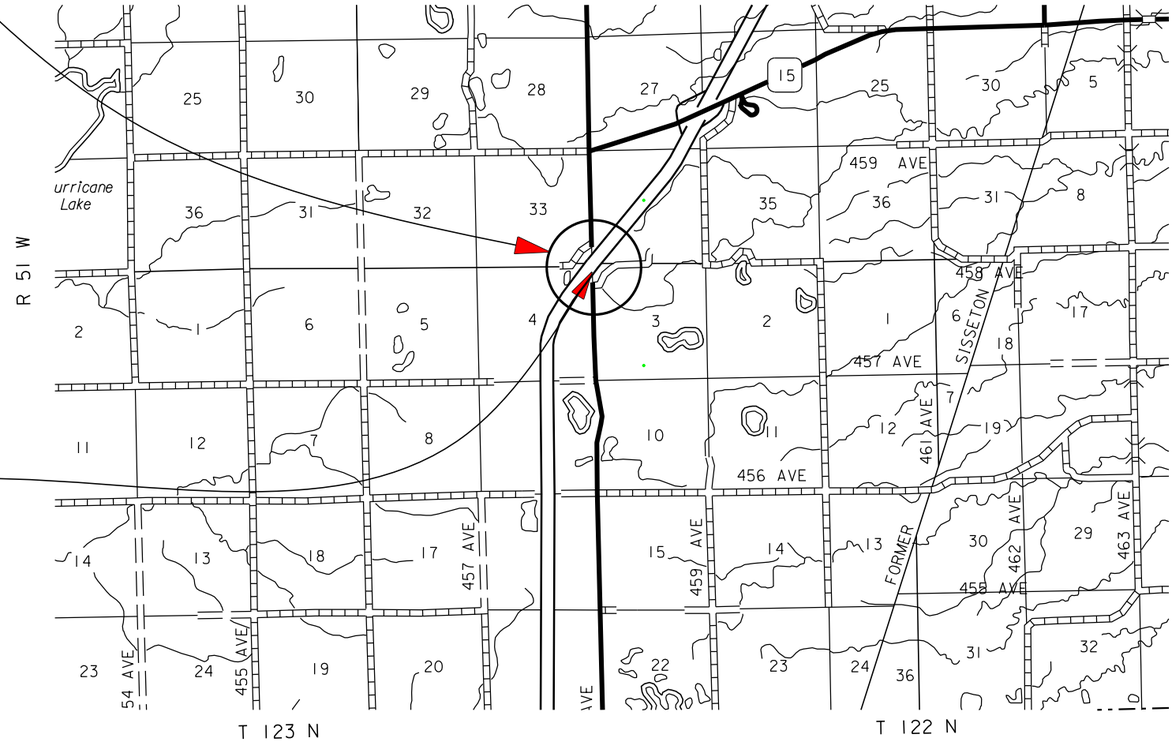
STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION
PLANS FOR PROPOSED

PROJECT 029 S-168
INTERSTATE 29
ROBERTS COUNTY

IMPACT DAMAGE REPAIR
PCN i5TG

INDEX OF SHEETS





Project Location
Str. No. 55-089-380
I-29 SBL - MRM 212.24

DESIGN DESIGNATION I29 SB

AADT (2018)	3007
AADT (2038)	3916
DHV	478
D%	50%
DHV T%	12.8%
AADT T%	28.0
V	80 MPH

STORM WATER PERMIT
None Required

PLOT SCALE - 1:7000
PLOTTED FROM - TRAB10200
PLOT NAME - 1
FILE - ...\ROBT15TG\15TG TITLE SHEET.DGN

ESTIMATE OF QUANTITIES AND ENVIRONMENTAL COMMITMENTS

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	029 S-168	2	19

GENERAL QUANTITIES

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
009E0010	Mobilization	Lump Sum	LS
410E0250	Heat Straighten Steel Member(s)	Lump Sum	LS
410E0380	Remove and Replace Steel Diaphragm	1	Each
410E0508	Field Weld	398	In
410E0512	Grind Weld	14	In
410E0515	Drill Hole in Existing Steel	1	Each
410E0520	Surface Grinding of Structural Steel	80	SqIn
410E3010	Magnetic Particle Weld Inspection	1,243	In
412E0100	Bridge Repainting, Class I	Lump Sum	LS
412E0500	Paint Residue Containment	Lump Sum	LS
634E0010	Flagging	10.0	Hour
634E0110	Traffic Control Signs	410.0	SqFt
634E0120	Traffic Control, Miscellaneous	Lump Sum	LS
634E0275	Type 3 Barricade	4	Each
634E0420	Type C Advance Warning Arrow Board	1	Each
634E0600	4" Temporary Pavement Marking Tape Type I	3,304	Ft

SPECIFICATIONS

Standard Specifications for Roads and Bridges, 2015 Edition and Required Provisions, Supplemental Specifications, and Special Provisions as included in the Proposal.

ENVIRONMENTAL COMMITMENTS

The SDDOT is committed to protecting the environment and uses Section A Environmental Commitments as a communication tool for the Engineer and Contractor to ensure that attention is given to avoid, minimize, and/or mitigate an environmental impact. Environmental commitments to various agencies and the public have been made to secure approval of this project. An agency with permitting authority can delay a project if identified environmental impacts have not been adequately addressed. Unless otherwise designated, the Contractor's primary contact regarding matters associated with these commitments will be the Project Engineer. These environmental commitments are not subject to change without prior written approval from the SDDOT Environmental Office.

Additional guidance on SDDOT's Environmental Commitments can be accessed through the Environmental Procedures Manual found at: https://dot.sd.gov/media/documents/EnvironmentalProceduresManual.pdf

For questions regarding change orders in the field that may have an effect on an Environmental Commitment, the Project Engineer will contact the Environmental Office at 605-773-3098 or 605-773-4336 to determine whether an environmental analysis and/or resource agency coordination is necessary.

COMMITMENT B: FEDERALLY THREATENED, ENDANGERED, AND PROTECTED SPECIES

COMMITMENT B4: BALD EAGLE

Bald eagles are known to occur in this area.

Action Taken/Required:

If a nest is observed within one mile of the project site, notify the Project Engineer immediately so that he/she can consult with the Environmental Office for an appropriate course of action.

COMMITMENT E: STORM WATER

Construction activities constitute less than 1 acre of disturbance.

Action Taken/Required:

At a minimum and regardless of project size, appropriate erosion and sediment control measures must be installed to control the discharge of pollutants from the construction site.

COMMITMENT H: WASTE DISPOSAL SITE

The Contractor will furnish a site(s) for the disposal of construction and/or demolition debris generated by this project.

Action Taken/Required:

Construction and/or demolition debris may not be disposed of within the Public ROW.

The waste disposal site(s) will be managed and reclaimed in accordance with the following from the General Permit for Construction/Demolition Debris Disposal Under the South Dakota Waste Management Program issued by the Department of Environment and Natural Resources.

The waste disposal site(s) will not be located in a wetland, within 200 feet of surface water, or in an area that adversely affects wildlife, recreation, aesthetic value of an area, or any threatened or endangered species, as approved by the Environmental Office and the Project Engineer.

If the waste disposal site(s) is located such that it is within view of any ROW, the following additional requirements will apply:

1. Construction and/or demolition debris consisting of concrete, asphalt concrete, or other similar materials will be buried in a trench completely separate from wood debris. The final cover over the construction and/or demolition debris will consist of a minimum of 1 foot of soil capable of supporting vegetation. Waste disposal sites provided outside of the Public ROW will be seeded in accordance with Natural Resources Conservation Service recommendations. The seeding recommendations may be obtained through the appropriate County NRCS Office. The Contractor will control the access to waste disposal sites not within the Public ROW with fences, gates, and placement of a sign or signs at the entrance to the site stating "No Dumping Allowed".

2. Concrete and asphalt concrete debris may be stockpiled within view of the ROW for a period of time not to exceed the duration of the project. Prior to project completion, the waste shall be removed from view of the ROW or buried and the waste disposal site reclaimed as noted above.

The above requirements will not apply to waste disposal sites that are covered by an individual solid waste permit as specified in SDCL 34A-6-58, SDCL 34A-6-1.13, and ARSD 74:27:10:06.

Failure to comply with the requirements stated above may result in civil penalties in accordance with South Dakota Solid Waste Law, SDCL 34A-6-1.31.

All costs associated with furnishing waste disposal site(s), disposing of waste, maintaining control of access (fence, gates, and signs), and reclamation of the waste disposal site(s) will be incidental to the various contract items.

COMMITMENT I: HISTORICAL PRESERVATION OFFICE CLEARANCES

State Historical Preservation Office (SHPO or THPO) concurrence has not been obtained for this project.

Action Taken/Required:

All earth disturbing activities require a cultural resource review prior to scheduling the pre-construction meeting. This work includes, but is not limited to: Contractor furnished material sources, material processing sites, stockpile sites, storage areas, plant sites, and waste areas.

The Contractor will arrange and pay for a record search and when necessary, a cultural resource survey. The Contractor has the option to contact the state Archaeological Research Center (ARC) at 605-394-1936 or another qualified archaeologist, to obtain either a records search or a cultural resources survey. A record search might be sufficient for review if the site was previously surveyed; however, a cultural resources survey may need to be conducted by a qualified archaeologist.

The Contractor will provide ARC with the following: a topographical map or aerial view of which the site is clearly outlined, site dimensions, project number, and PCN. If applicable, provide evidence that the site has been previously disturbed by farming, mining, or construction activities with a landowner statement that artifacts have not been found on the site.

The Contractor will submit the cultural resources survey report to SDDOT Environmental Office, 700 East Broadway Avenue, Pierre, SD 57501-2586. SDDOT will submit the information to the appropriate SHPO/THPO. Allow **30 Days** from the date this information is submitted to the Environmental Engineer for SHPO/THPO review.

In the event of an inadvertent discovery of human remains, funerary objects, or if evidence of cultural resources is identified during project construction activities, then such activities will immediately cease and the Project Engineer will be immediately notified. The Project Engineer will contact the SDDOT Environmental Office to determine an appropriate course of action.

The Contractor is responsible for obtaining any additional permits and clearances for Contractor furnished material sources, material processing sites, stockpile sites, storage areas, plant sites, and waste areas that affect wetlands, threatened and endangered species, or waterways. The Contractor will not utilize a site known or suspected of having contaminated soil or water. The Contractor will provide the required permits and clearances to the Project Engineer at the preconstruction meeting.

PROJECT START DATE

Work on this project may not begin until after June 7, 2020.

SEQUENCE OF OPERATIONS & TRAFFIC CONTROL

The following sequence of operations will be followed unless an alternate sequence is submitted in writing to the Area Engineer two weeks prior to the preconstruction meeting and approved.

1. Install traffic control devices to close one lane of the County Road as well as the right lane of I-29 SB. The lane to be closed on the County Road shall coincide with where heat straightening and superstructure repair is located.

2. Switch traffic control on the County Road to the opposite lane. Retain sclosure of I-29 SB.

3. Remove traffic control devices once the superstructure repairs are completed.

GENERAL MAINTENANCE OF TRAFFIC

Standard plate 634.25 will be used when an overnight or longer lane closure is required on the County Road. The length of the closure will be kept to a minimum to allow the maximum amount of sight distance. Standard Plate 634.23 has been included in the plans and may be used as an alternate lane closure, as approved by the Engineer. If this closure is used it must be returned to the stop condition prior to nightfall.

Any traffic control devices presently in place on I-29 will be neatly stockpiled as directed by the Engineer.

The lane closure on I-29 must be installed prior to beginning girder repairs and remain in place until the project is complete.

I-29 Traffic may not be stopped at any time to facilitate the Contractor’s operation.

A 16’ lane of travel must be maintained on I-29 at all times.

A 14’ lane of travel must be maintained on the County Road.

Flaggers will be required where work activity and/or equipment may encroach into a lane open to traffic.

4” Temporary Pavement Marking Tape Type I will be used to make the 24” Stop Bars on the County Road.

The no passing zone lines shown on standard plate 634.23 and the taper line show on standard plate 634.63 may be Temporary Raised Pavement Markings (Tabs) spaced at 5’.

WORK ZONE SPEED REDUCTION

The Department is required to obtain a speed reduction resolution prior to the installation of any SPEED LIMIT (R2-1) signs shown on standard plate 634.63. To provide adequate time for the resolution to be enacted, the Contractor will inform the Engineer a minimum of 3 weeks prior to the scheduled installation of any work zone speed reduction signs on the project. The information provided by the Contractor will include the anticipated date of sign installation, the newly reduced speed limit, the location of the work zone, and the anticipated completion date of work requiring the speed reduction.

Posted Speed Prior to Work (M.P.H.)	Spacing of Advance Warning Signs (Feet) (A)	Spacing of Channelizing Devices (Feet) (G)
0 - 30	200	25
35 - 40	350	25
45	500	25
50	500	50
55	750	50
60 - 65	1000	50

Flagger

Channelizing Device

For low-volume traffic situations with short work zones on straight roadways where the flagger is visible to road users approaching from both directions, a single flagger may be used.

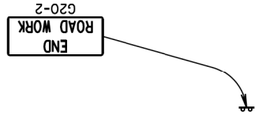
The ROAD WORK AHEAD and the END ROAD WORK signs may be omitted for short duration operations (1 hour or less).

For tack and/or flush seal operations, when flaggers are not being used, the FRESH OIL sign (W21-2) shall be displayed in advance of the liquid asphalt areas.

Flashing warning lights and/or flags may be used to call attention to the advance warning signs.

The channelizing devices shall be drums or 42" cones.

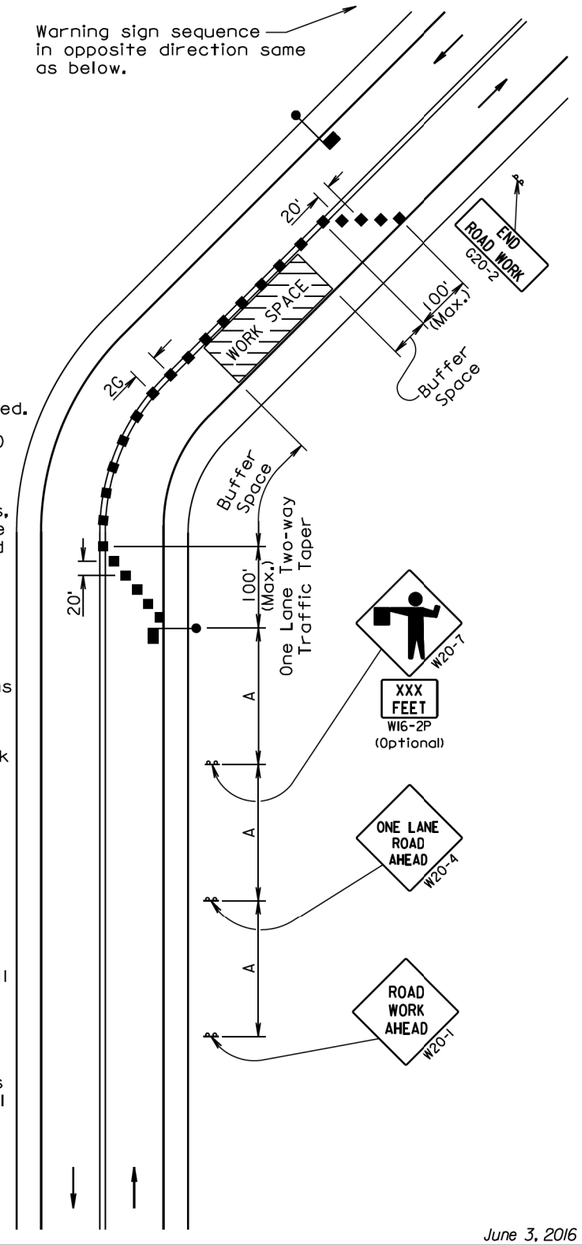
Channelizing devices are not required along the centerline adjacent to work area when pilot cars are utilized for escorting traffic through the work area.



Channelizing devices and flaggers shall be used at intersecting roads to control intersecting road traffic as required.

The buffer space should be extended so that the two-way traffic taper is placed before a horizontal or vertical curve to provide adequate sight distance for the flagger and queue of stopped vehicles.

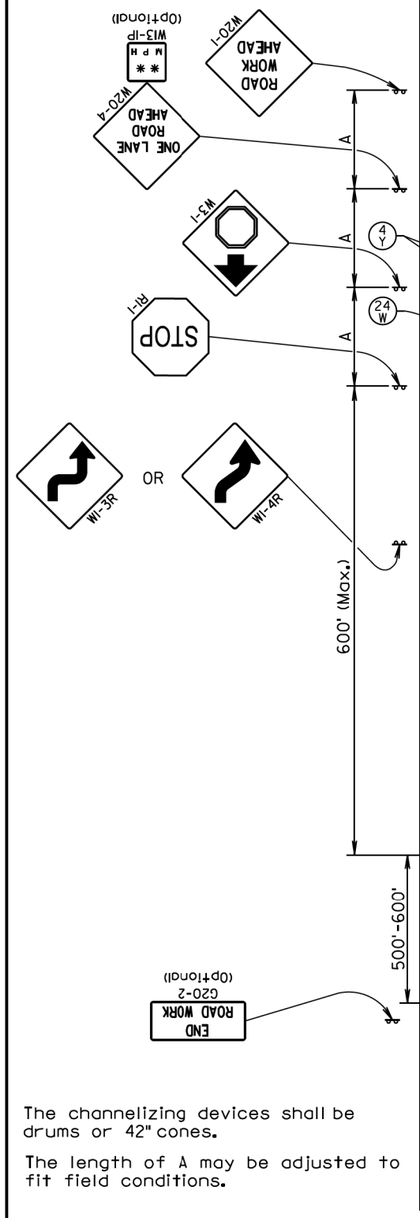
The length of A may be adjusted to fit field conditions.



June 3, 2016

Published Date: 1st Qtr. 2020	SDDOT	GUIDES FOR TRAFFIC CONTROL DEVICES LANE CLOSURE WITH FLAGGER PROVIDED	PLATE NUMBER 634.23
			Sheet 1 of 1

Posted Speed Prior to Work (M.P.H.)	Spacing of Advance Warning Signs (Feet) (A)	Taper Length (Feet) (L)	Spacing of Channelizing Devices (Feet) (G)
0 - 30	200	180	25
35 - 40	350	320	25
45	500	600	25
50	500	600	50
55	750	660	50
60 - 65	1000	780	50



The channelizing devices shall be drums or 42" cones.

The length of A may be adjusted to fit field conditions.

June 3, 2016

Published Date: 1st Qtr. 2020	SDDOT	GUIDES FOR TRAFFIC CONTROL DEVICES LANE CLOSURE USING STOP SIGNS	PLATE NUMBER 634.25
			Sheet 1 of 1

PLOT SCALE - 1:200

PLOT NAME - 2

FILE - ...\PRJ\ROBT15TG\STD PLATE1.DGN

PLOTTED FROM - TRAB10200

Posted Speed Prior to Work (M.P.H.)	Spacing of Advance Warning Signs (Feet) (A) (B) (C)
0 - 30	200
35 - 40	350
45 - 50	500
55	750
60 - 65	1000
	(A) (B) (C)
70 - 80	1000 1500 2640

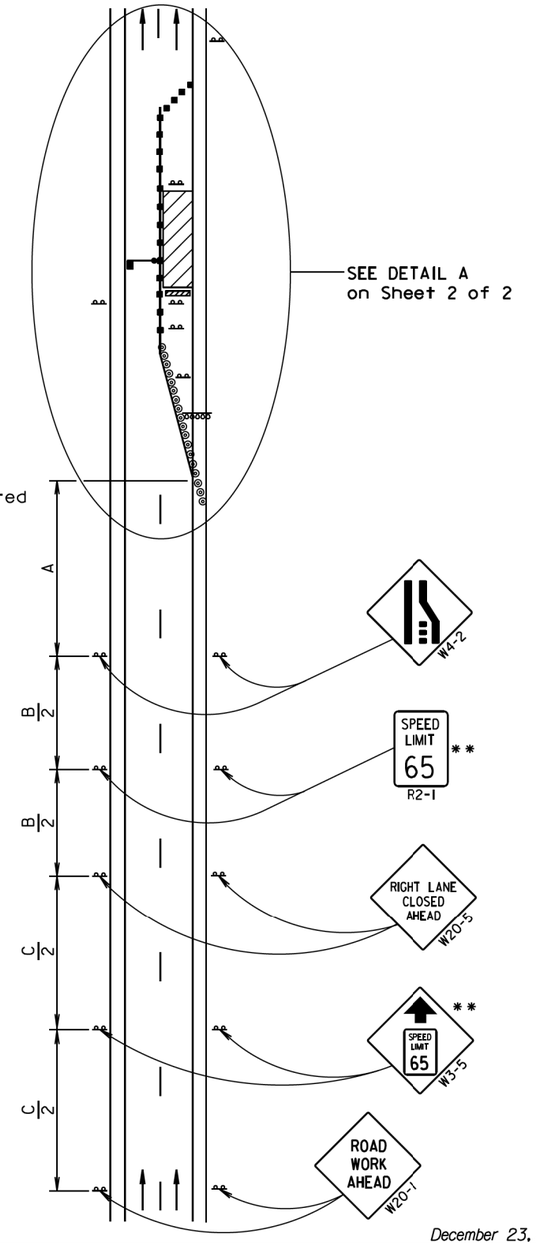
** Speed appropriate for location.

◎ Reflectorized Drum

■ Channelizing Device

ROAD WORK AHEAD sign is only required in advance of the first lane closure.

High speed is defined as having a posted speed limit greater than 45 mph.



December 23, 2019

Published Date: 1st Qtr. 2020	SDDOT	WORK ZONE SPEED REDUCTION FOR INTERSTATE AND HIGH SPEED MULTI-LANE HIGHWAYS	PLATE NUMBER 634.63 Sheet 1 of 2

Posted Speed Prior to Work (M.P.H.)	Spacing of Channelizing Devices (Feet) (G)	Taper Length (Feet) (L)
0 - 30	25	180
35 - 40	25	320
45	25	600
50	50 *	600
55	50 *	660
60 - 65	50 *	780
70 - 80	50 *	960

* Spacing is 40' for 42" cones.

** Speed appropriate for location.

*** Use speed limit designated for the condition when workers are present in the work space. Signs will be covered or removed when workers are not present.

■—● Flagger (As Necessary)

◎ Reflectorized Drum

■ Channelizing Device

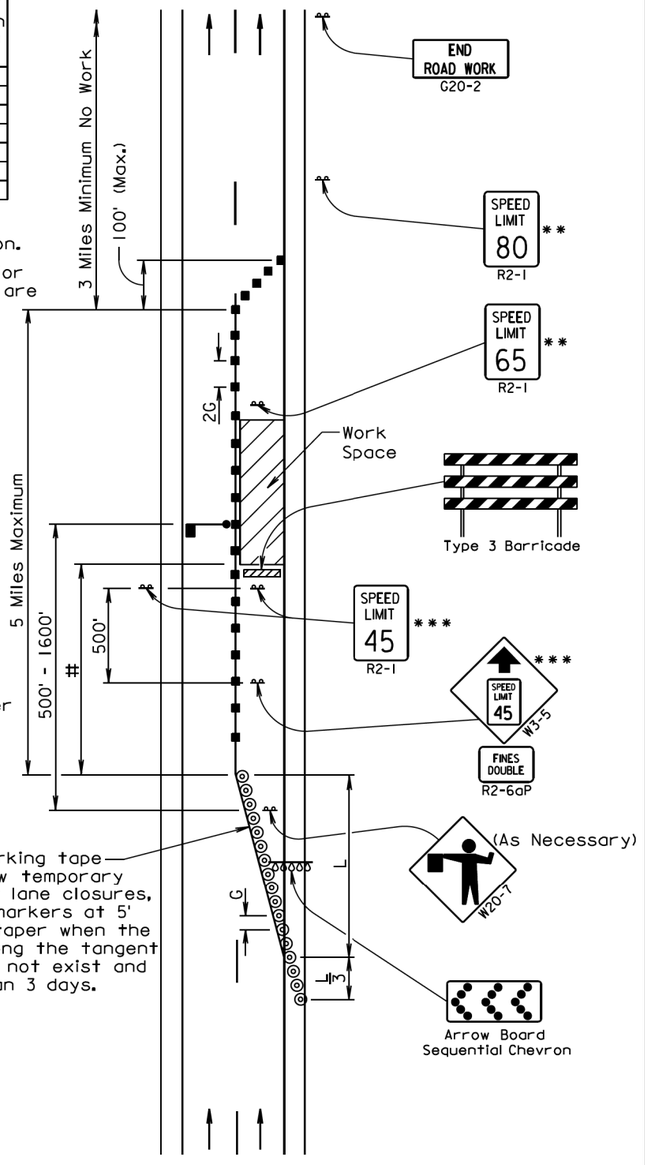
The Work Space will be a minimum of 500' from the end of the taper.

The FLAGGER sign will be used whenever there is a Flagger present.

The channelizing devices will be 42" cones or drums.

42" cones may be used in place of the drums shown in the taper if setup will not be used during night time hours.

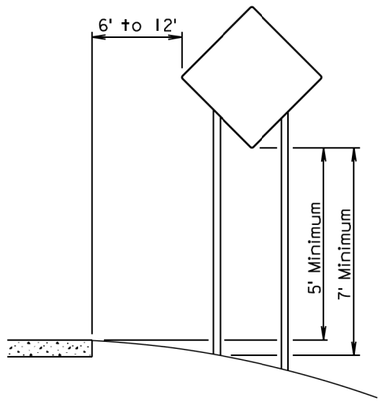
4" white temporary pavement marking tape for right lane closures, 4" yellow temporary pavement marking tape for left lane closures, or temporary raised pavement markers at 5' spacing will be installed in the taper when the lane is closed overnight, and along the tangent section where the skip lines do not exist and the lane is closed for more than 3 days.



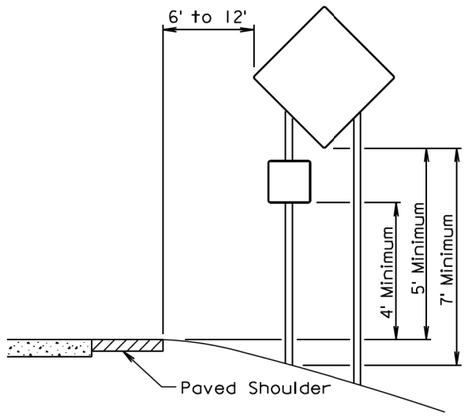
DETAIL A

December 23, 2019

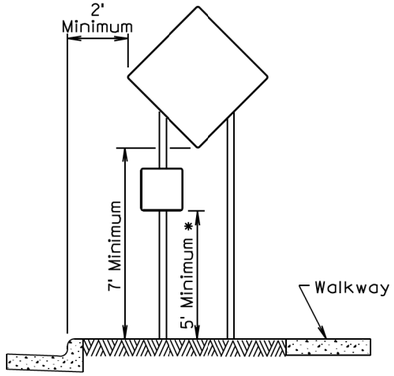
Published Date: 1st Qtr. 2020	SDDOT	WORK ZONE SPEED REDUCTION FOR INTERSTATE AND HIGH SPEED MULTI-LANE HIGHWAYS	PLATE NUMBER 634.63 Sheet 2 of 2



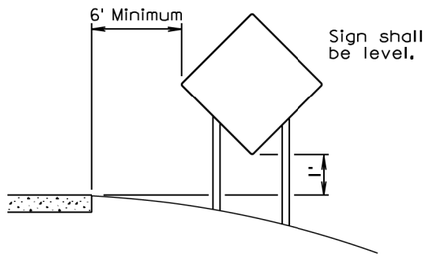
RURAL DISTRICT



RURAL DISTRICT WITH SUPPLEMENTAL PLATE



URBAN DISTRICT

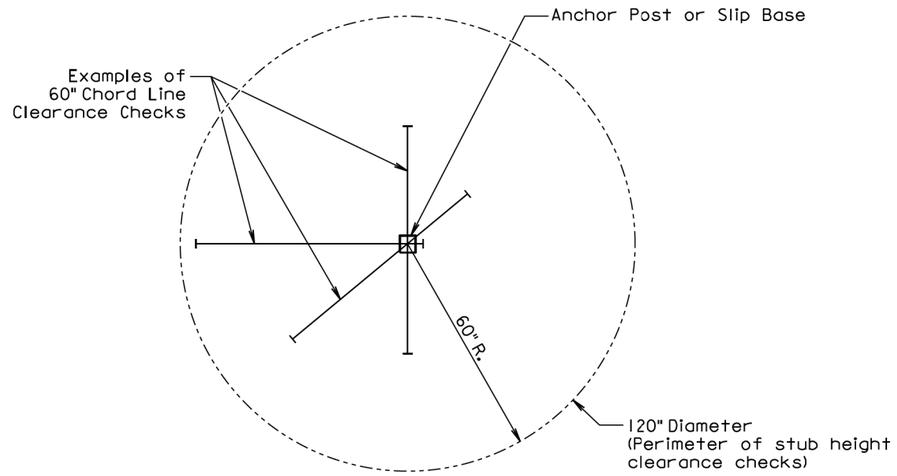


RURAL DISTRICT
3 DAY MAXIMUM
(Not applicable to regulatory signs)

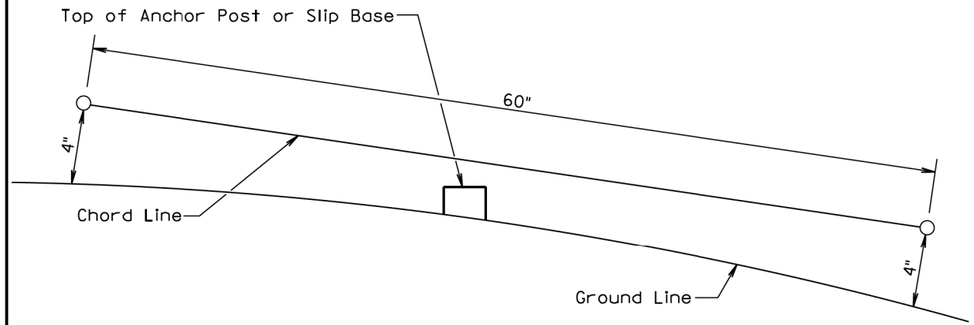
* If the bottom of supplemental plate is mounted lower than 7 feet above a pedestrian walkway, the supplemental plate should not project more than 4" into the pedestrian facility.

September 22,2014

Published Date: 1st Qtr. 2020	SDDOT	CRASHWORTHY SIGN SUPPORTS (Typical Construction Signing)	PLATE NUMBER 634.85
			Sheet 1 of 1



PLAN VIEW
(Examples of stub height clearance checks)



ELEVATION VIEW

GENERAL NOTES:

The top of anchor posts and slip bases SHALL NOT extend above a 60" chord line within a 120" diameter circle around the post with ends 4" above the ground.

At locations where there is curb and gutter adjacent to the breakaway sign support, the stub height shall be a maximum of 4" above the ground line at the localized area adjacent to the breakaway support stub.

The 4" stub height clearance is not necessary for U-channel lap splices where the support is designed to yield (bend) at the base.

July 1, 2005

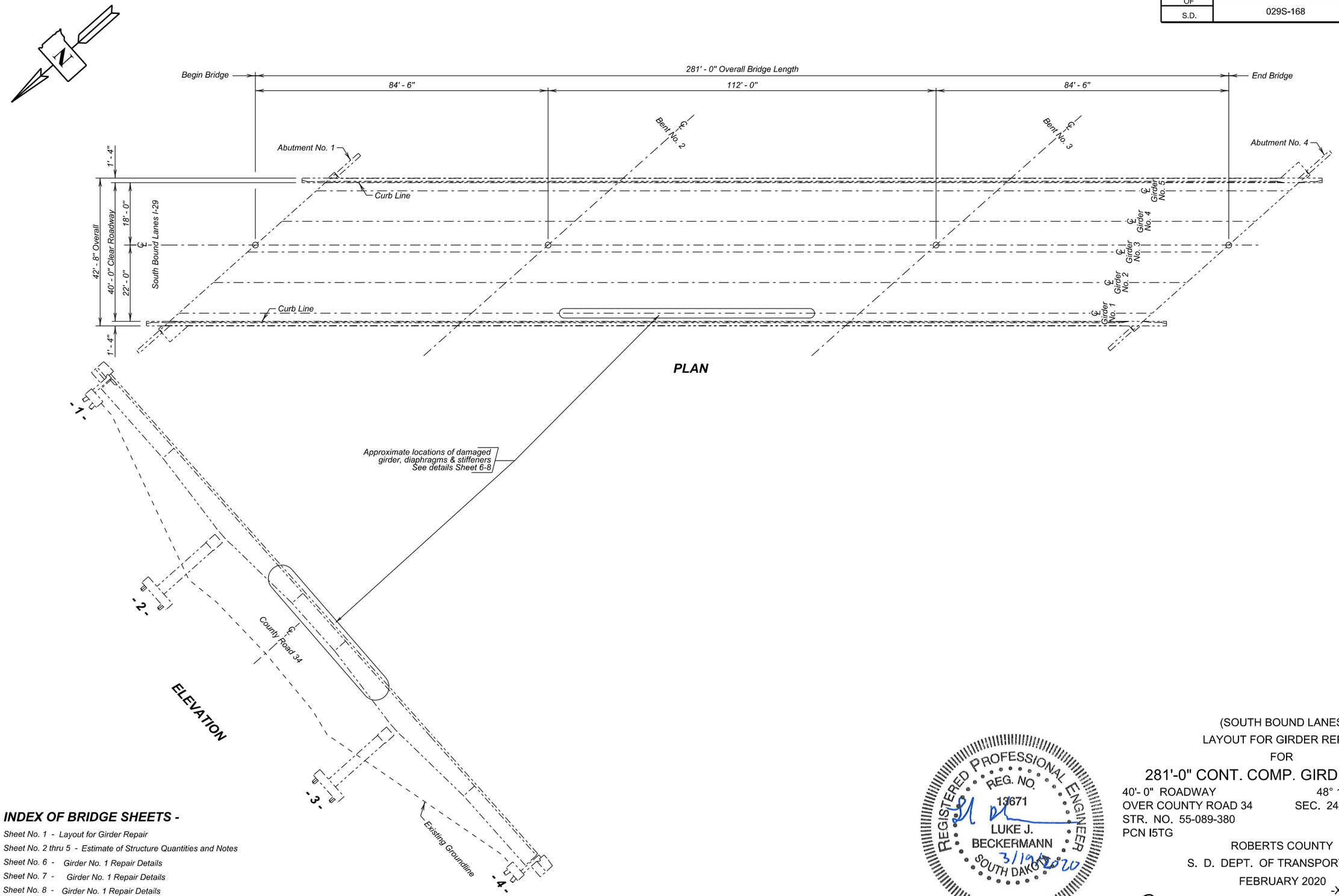
Published Date: 1st Qtr. 2020	SDDOT	BREAKAWAY SUPPORT STUB CLEARANCE	PLATE NUMBER 634.99
			Sheet 1 of 1

STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	TOTAL SHEETS
	029 S-168	8	19
Plotting Date: 03/23/2020			

ITEMIZED LIST FOR TRAFFIC CONTROL SIGNS

		CONVENTIONAL ROAD				EXPRESSWAY / INTERSTATE			
SIGN CODE	SIGN DESCRIPTION	NUMBER	SIGN SIZE	SQFT PER SIGN	SQFT	NUMBER	SIGN SIZE	SQFT PER SIGN	SQFT
R1-1	STOP	2	30"	5.2	10.4		36"	7.5	
R2-1	SPEED LIMIT 45		24" x 30"	5.0		2	36" x 48"	12.0	24.0
R2-1	SPEED LIMIT 65		24" x 30"	5.0		2	36" x 48"	12.0	24.0
R2-1	SPEED LIMIT 80		24" x 30"	5.0		1	36" x 48"	12.0	12.0
R2-6aP	FINES DOUBLE (plaque)		24" x 18"	3.0		1	36" x 24"	6.0	6.0
W1-4	REVERSE CURVE (L or R)	1	48" x 48"	16.0	16.0		48" x 48"	16.0	
W3-1	STOP AHEAD (symbol)	2	48" x 48"	16.0	32.0		48" x 48"	16.0	
W3-5	SPEED REDUCTION AHEAD (XX MPH)		48" x 48"	16.0		3	48" x 48"	16.0	48.0
W4-2	LEFT or RIGHT LANE ENDS (symbol)		48" x 48"	16.0		2	48" x 48"	16.0	32.0
W13-1P	ADVISORY SPEED (plaque)	2	30" x 30"	6.3	12.6		30" x 30"	6.3	
W20-1	ROAD WORK AHEAD	2	48" x 48"	16.0	32.0	2	48" x 48"	16.0	32.0
W20-4	ONE LANE ROAD AHEAD	2	48" x 48"	16.0	32.0		48" x 48"	16.0	
W20-5	LEFT or RIGHT LANE CLOSED AHEAD		48" x 48"	16.0		2	48" x 48"	16.0	32.0
W20-7	FLAGGER (symbol)	2	48" x 48"	16.0	32.0	1	48" x 48"	16.0	16.0
G20-2	END ROAD WORK	2	36" x 18"	4.5	9.0	1	48" x 24"	8.0	8.0
		CONVENTIONAL ROAD TRAFFIC CONTROL SIGNS SQFT			176.0	EXPRESSWAY / INTERSTATE TRAFFIC CONTROL SIGNS SQFT			234.0

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	029S-168	9	19



INDEX OF BRIDGE SHEETS -

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 13671
LUKE J. BECKERMANN
SOUTH DAKOTA
3/19/2020

(SOUTH BOUND LANES)
LAYOUT FOR GIRDER REPAIR
FOR
281'-0" CONT. COMP. GIRDER BRIDGE

40'- 0" ROADWAY — 48° 19' SKEW L.H.F.
OVER COUNTY ROAD 34 — SEC. 24/33-T123N-R51W
STR. NO. 55-089-380 — 029S-168
PCN I5TG

ROBERTS COUNTY
S. D. DEPT. OF TRANSPORTATION
FEBRUARY 2020 -X271- 1 OF 11

Houston Engineering Inc.

DESIGNED BY	CK. DES. BY	DRAFTED BY
LJB	JLM	SMH

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	029S-168	10	19

ESTIMATE OF STRUCTURE QUANTITIES

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
410E0250	Heat Straighten Steel Member(s)	Lump Sum	LS
410E0380	Remove and Replace Steel Diaphragm	1	Each
410E0508	Field Weld	398	In
410E0512	Grind Weld	14	In
410E0515	Drill Hole in Existing Steel	1	Each
410E0520	Surface Grinding of Structural Steel	80	SqIn
410E3010	Magnetic Particle Weld Inspection	1243	In
412E0100	Bridge Repainting, Class I	Lump Sum	LS
412E0500	Paint Residue Containment	Lump Sum	LS

SPECIFICATIONS

1. Design Specifications: AASHTO Standard Specifications for Highway Bridges 17th Edition using Working Stress Design.

2. Construction Specifications: South Dakota Standard Specifications for Roads and Bridges, 2015 Edition and Required Provisions, Supplemental Specifications and Special Provisions as included in the Proposal.

3. All Welding and Welding Inspection shall be in conformance with the AASHTO/AWS Bridge Welding Code D1.5M/D1.5:2015 unless otherwise noted in this plan set.

PRE-CONSTRUCTION MEETING

A pre-construction meeting is required prior to beginning the repair work. The purpose of the meeting is to review the plans and procedures because of the specialty work involved. At a minimum, a representative from the Contractor and all Subcontractors shall attend this meeting along with Department personnel from the Area Office and Bridge Office. The contractor must notify the Bridge Construction Engineer and the Area Office at least five days prior to the meeting.

DETAILS AND DIMENSIONS OF EXISTING BRIDGE

All details and dimensions of the existing bridge, contained in these plans, are based on the original construction plans and shop plans and are provided as information only. It is the Contractor's responsibility to inspect and verify the actual field conditions and any necessary as-built dimensions affecting the satisfactory completion of the work required for this project.

SHOP PLANS

Shop plans shall be required as specified by Section 410.3.A of the Construction Specifications.

GENERAL CONSTRUCTION

1. Welder certification shall be in accordance with Section 410.3.D of the Construction Specifications.

2. The new steel diaphragm plates shall be ASTM A709 Gr. 36.

NOTICE – LEAD BASED PAINT

Be advised that the paint on the steel surfaces of the existing structure is a paint containing lead. The Contractor should plan his/her operations accordingly and inform employees of the hazards of lead exposure.

SCOPE OF BRIDGE WORK

1. Identify and mark all yield lines, yielded zones, and surface nicks and gouges.

2. Grind surface nicks and gouges.

3. Clean and prepare area to be tested as specified by the Bridge Welding Code and these notes.

4. Nondestructive test fillet welds, crack tips and potential crack tips at the locations shown in the plans.

5. Repair crack tips and weld flaws found by nondestructive testing prior to heat straightening. No heat straightening shall be performed until the nondestructive testing is complete and any necessary repairs are done for the member to be straightened.

6. Heat straighten damaged girder G1 including top and bottom flanges, web, and transverse stiffeners.

7. Re-weld web to bottom flange in plan specified locations.

8. Perform nondestructive testing required after heat straightening and perform any repairs required.

9. Remove and replace the plan specified diaphragm on girder G1.

10. Perform nondestructive testing required after heat repairs.

11. Repair crack tips, and weld flaws found by nondestructive testing.

12. Clean and paint work affected areas and new structural steel.

FIELD WELDING PROCEDURES

1. Approved Welding Procedure Specifications (WPS) will be required for this project, using the Shielded Metal Arc Welding (SMAW) process and an approved E7018 electrode from Table 4.1 of the Bridge Welding Code. The proposed WPSs for this project shall be submitted on Form O-2, from Annex O of the Bridge Welding Code, to the Bridge Construction Engineer for approval at least 2 weeks prior to construction.

2. Preparation of the base metal prior to welding shall be in accordance with Clause 3 of the Bridge Welding Code. Existing paint shall be removed a distance of 2 inches from each side of the weld.

3. Preheat will be required. Preheat and interpass temperature requirements shall be in accordance with Clause 4.2 of the Bridge Welding Code. The minimum pre-heat and interpass temperature shall be 320 degrees F for welds to the 1 ¼" and ½" girder flanges and 300 degrees F for welds to the 5/16" girder web as determined from Annex G of the Bridge Welding Code for high restraint conditions. Temperature indicating crayons shall be the minimum acceptable method for monitoring preheat and interpass temperatures.

4. SMAW electrode atmospheric exposure requirements shall comply with Clause 4.5 of the Bridge Welding Code. Electrodes shall be purchased in hermetically sealed containers. If the container shows evidence of damage, the electrodes shall be dried in a drying oven for at least one hour at temperatures between 700 and 800 degrees F before they are used. Immediately after opening a hermetically sealed container or removal of the electrodes from a drying oven, electrodes shall be stored in ovens at a temperature of at least 250 degrees F. Electrodes exposed to the atmosphere upon removal from drying or storage ovens or hermetically sealed containers shall be used within four hours maximum or redried at 450 to 550 degrees F for two hours minimum. Electrodes exposed to the atmosphere for periods less than four hours may be returned to a storage oven and maintained at a minimum of 250 degrees F for a minimum of four hours before reissue. Electrodes shall be redried no more than one time. Electrodes which have been wet shall not be used.

5. All welds shall be cleaned in accordance with Clause 3.11 of the Bridge Welding Code. Completed welds and adjacent areas shall be cleaned of all weld splatter, slag, smoke and heat affected paint. No intermittent or "stitch" welds will be allowed.

6. E7018 electrodes shall be used for tack welds. The size of tack welds shall not be greater than 5/16". Tack welds shall be positioned so they will be incorporated into, and re-melted by, the final weld. Tack welds shall be thoroughly cleaned prior to any weld placement.

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3/19/2020

ESTIMATE OF STRUCTURE QUANTITIES AND NOTES

FOR

281'-0" CONT. COMP. GIRDER BRIDGE

Str. No. 55-089-380

FEBRUARY 2020 (2) (11)

DESIGNED BY:	CK. DES.BY:	DRAWN BY::
LJB	JLM	SMH

WELD INSPECTION AND NONDESTRUCTIVE TESTING (NDT)

1. The Contractor shall be responsible for retaining a qualified Testing Agency to perform Visual, Magnetic Particle (MT), and Ultrasonic (UT) inspection of existing and new welds and to locate existing and potential crack tips. Inspectors performing Visual, MT and UT inspection and crack tip location shall be certified in accordance with Section 410.3 D of the Construction Specifications. The Contractor shall submit the Testing Agency to the Department at the Preconstruction meeting for approval by the Bridge Construction Engineer.

2. All Nondestructive Testing (NDT), required cleaning, preparation, and inspection shall be done in accordance with Clause 6 of the Bridge Welding Code. Existing paint shall be removed from the steel surfaces that require NDT. Power tools used for cleaning shall be in accordance with SSPC-3. The MT inspection shall be performed by the yoke method using half-wave rectified direct or alternating current. MT inspection results shall be reported on Form O-7 of Annex O and UT results shall be reported on Form F-4 of Annex F of the Bridge Welding Code.

3. The Contractor shall identify and mark all yield zones, yield lines, and associated damage and provide this information to the Engineer prior to the initiation of heat straightening and testing by either visual inspection or measurements.

4. Testing for defects and crack tips shall be made prior to any heat straightening. Repair options for the defects and crack tips shall be determined by the Bridge Construction Engineer—see note on Repairs for NDT Determined Flaws. Repairs shall be made prior to any heat straightening.

5. As a minimum, the existing fillet welds shall be inspected as noted below. Defects shall be clearly marked on the girder in accordance with the Bridge Welding Code and a written record of the defects shall be given to the Engineer for transmittal to the Bridge Construction Engineer. Any suspected cracks shall be verified by magnetic particle inspection with the crack tips located. Crack tip locations shall be clearly marked on the girder and a written record of the crack tip location shall be given to the Engineer for transmittal to the Bridge Construction Engineer. Notify the Bridge Construction Engineer if any cracks or crack tips are located in the girder flange.

   a. Visually Inspect 100% of the existing fillet welds in the deformed and damaged area. The deformed length is estimated to be 112 feet.

   b. MT test the bottom flange to web weld, on both sides of the web, a minimum of 12” beyond any yielded girder zones for an estimated 204 inches.

   c. On the transverse stiffeners to be heat straightened or have welds removed and replaced, MT test the stiffener welds to web top, bottom, and both sides of the stiffener for an estimated 576 linear inches.

   d. MT test both sides of the stiffener to web weld and both sides top and bottom of the stiffener to flange welds at the diaphragms to be removed and replaced. This includes the diaphragm stiffeners on each end of the diaphragm and the outside transverse stiffener for an estimated 326 linear inches.

6. The above listed quantities are provided as an estimate based on field documentation of the damage. If any other areas are identified as having potential flaws or require heat straightening these areas shall be tested as directed by the Engineer.

7. After heat straightening, the areas listed above shall be retested to ensure no additional cracks have developed. The estimated weld length and area for re-testing is 1106 linear inches.

8. New fillet welds on stiffeners and diaphragms shall be 100% visually inspected and 20% magnetic particle inspected. Based on the results of the magnetic particle and visual inspection, the Bridge Construction Engineer will determine the acceptability of the completed fillet welds and any recommended repairs. Rejected defects in new welds shall be repaired in accordance with the Bridge Welding Code. Repaired welds shall be re-inspected after all repairs are complete. The estimated length for MT inspection is 65 linear inches.

9. New fillet welds between web and bottom flange shall be 100% visually inspected and 100% magnetic particle inspected. Based on the results of the magnetic particle and visual inspection, the Bridge Construction Engineer will determine the acceptability of the completed fillet welds and any recommended repairs. Rejected defects in new welds shall be repaired in accordance with the Bridge Welding Code. Repaired welds shall be re-inspected after all repairs are complete. The estimated length for MT inspection is 72 linear inches.

10. The plans listed quantity for nondestructive testing inspection is only an estimate. Magnetic Particle Weld Inspection and Ultrasonic Weld Inspection will be measured to the nearest inch. Measurement shall be approved by the Bridge Construction Engineer.

11. All costs including labor, equipment, cleaning, paint removal, and any incidentals necessary to perform the visual inspection, magnetic particle inspection and crack tip location shall be incidental to the contract unit price per inch for Magnetic Particle Weld Inspection.

REPAIRS FOR NDT DETERMINED FLAWS

1. Repair options for weld defects and crack tips shall be determined by the Bridge Construction Engineer. Two potential repair options are:

   a. Drill 1” diameter hole in all crack tips.

   b. Repair fillet weld defects by removing the weld with the air carbon arc process and then grinding flush. Grinding shall be in the longitudinal direction. Transverse grinding will not be allowed. The repair shall then be re-welded in accordance with the Bridge Welding Code.

2. All labor, equipment, materials and incidentals necessary to drill holes in the web shall be incidental to the contract unit price per each for Drill Hole in Existing Steel.

3. All labor, equipment, materials and incidentals necessary including air carbon arc removal and grinding of welds shall be incidental to the contract unit price per inch for Grind Weld.

4. All labor, equipment, materials and incidentals necessary to re-weld the repair shall be incidental to the contract unit price per inch for Field Weld.

5. Other repair options shall be at the discretion of the Bridge Construction Engineer.

HEAT STRAIGHTENING

1. This Contract includes heat straightening of steel girders, including bottom flange, web, transverse stiffeners and diaphragms. Heat straightening is considered specialty work and only the following contractors are allowed to do this work. Contact:

   Judd Holt
   International Straightening Incorporated
   901 E. Bristol Drive
   Bismarck, ND 58501
   Telephone: (701) 223-5972 or (701) 751-1683
   Fax: (701) 751-1683
   E-mail: isisteel@gmail.com
   Website: www.steelstraightening.com

   Darryl Thomas
   Flame On, Inc.
   12632 Wagner Road
   Monroe, WA 98272
   Telephone: (425) 397-7039
   Fax: (425) 397-7002
   Cellular: (425) 501-9855
   E-mail: d.thomas@flameon.com
   Website: www.flameoninc.com

2. Heat Straightening requires nondestructive testing of both new and existing welds. The Contractor shall use a qualified testing agency subject to the approval by the Bridge Construction Engineer. The Contractor shall submit the testing agency to the Area Office for approval of the Bridge Construction Engineer. See Weld Inspection & Nondestructive Testing notes elsewhere in these plans.

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 13671
LUKE J. BECKERMANN
SOUTH DAKOTA
3/19/2020

NOTES (CONTINUED)

FOR

281’-0” CONT. COMP. GIRDER BRIDGE

Str. No. 55-089-380

FEBRUARY 2020

HEAT STRAIGHTENING (CONTINUED)

3. The equipment used for heat straightening shall be an oxygen-fuel combination. The fuel shall be propane or acetylene. The application of heat shall be by single or multiple orifice tips only. The size of the tip shall be proportional to the thickness of the heated material. As a guide, the following table shows the recommended tip sizes. No cutting torch heads are permitted.

Steel Thickness (in)	Orifice Type	Size
< 1/4	Single	3
3/8	Single	4
1/2	Single	5
5/8	Single	7
3/4	Single	8
1	Single Rosebud	8 3
2	Single Rosebud	8 4
3	Rosebud	5
> 4	Rosebud	5

4. The temperature of all steel during heat straightening shall not exceed 1,200° F. The Contractor shall use one or more of the following methods for verifying temperatures during heat straightening.

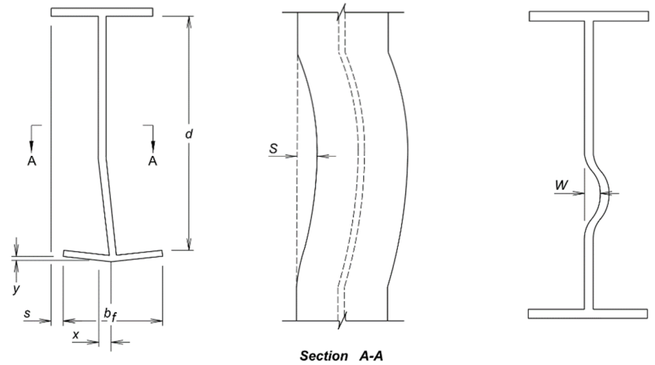
   a. Temperature sensitive crayons
   b. Pyrometer
   c. Infrared non-contact thermometer

5. Material should be heated in a single pass and shall be allowed to air cool to below 250°F prior to re-heating.

6. Hot Mechanical Straightening and Hot Working will **NOT** be allowed.

7. Jacks used to aide heat straightening shall be placed so that forces are relieved as straightening occurs during cooling. Jacking shall be limited so that the maximum bending moment in the heated zone shall be less than 50% of the plastic moment capacity of the member or 50% of yield for local forces. The yield of the material is 36 ksi.

8. The final dimensions of heat straightened structural members shall conform to the following tolerances:



d = original depth of web
bf = original width of flange
X = final displacement of web ≤ maximum of d/100 or ¼”
Y = final displacement of edge of flange ≤ ¼ “
W = maximum final local deformation in web ≤ ¼”
S = sweep of flange from original edge of flange ≤ ½“ over 20 ft

9. All labor, materials, equipment, and any incidentals necessary to perform the required heat straightening shall be incidental to the contract lump sum price for Heat Straighten Steel Member(s).

REMOVE AND REPLACE DIAPHRAGMS

1. The existing diaphragm and diaphragm stiffeners shown in the plans shall be removed prior to heat straightening and nondestructive testing. Removed diaphragm portion shall not be reused and shall be disposed of by the Contractor.

2. Cutting of the existing diaphragm and diaphragm stiffener shall be accomplished using the air carbon arc process or plasma cutting. Weld removal shall be by air carbon arc gouging.

3. The diaphragm and diaphragm stiffener shall be replaced and welded as shown in the Plans, after the web repairs and heat straightening are complete.

4. During the removal and replacement procedure, additional nondestructive testing may be required. See notes regarding Weld Inspection & Nondestructive Testing (NDT).

5. All labor, materials, and equipment necessary to remove and replace the diaphragms and diaphragm stiffeners as shown on the Plans will be incidental to the contract unit price per each for Remove and Replace Steel Diaphragm.

REMOVE AND REPLACE DAMAGED WELDS

1. The damaged transverse stiffener welds as well as web to bottom flange welds shown in the plans shall be replaced by grinding damaged weld and re-welding. Grinding shall be in the longitudinal direction. Transverse grinding will not be allowed. The stiffener shall then be re-welded in accordance with the Bridge Welding Code.

2. All repaired welds shall be checked by non-destructive MT testing after grinding; see Weld Inspection & Nondestructive (NDT) note. Repair options for the defects found by the non-destructive testing shall be determined by the Bridge Construction Engineer.

3. All costs associated with grinding the damaged transverse stiffener welds and web to bottom flange welds, including all materials, equipment and labor shall be incidental to the contract unit price per inch for Grind Weld.

4. All costs associated with re-welding the transverse stiffener welds and web to bottom flange welds, including all materials, equipment and labor shall be incidental to the contract unit price per inch for Field Weld.

REMOVAL OF SURFACE NICKS AND GOUGES

1. Grind the bottom flange of girder G1 as directed by the Engineer, to remove all sharp edges from surface nicks and gouges created by vehicle impact. The amount of material removed shall be kept at the absolute minimum necessary to remove the sharp edges and to minimize the section reduction of the existing structural members. Grinding shall be longitudinal. Transverse grinding will not be allowed. The grinding shall be done prior to heat straightening the girder.

2. All surface nicks and gouges shall be checked by non-destructive MT testing after grinding; see Weld Inspection & Nondestructive Testing (NDT) note. Repair options for the defects found by the nondestructive testing shall be determined by the Bridge Construction Engineer.

NOTES (CONTINUED)

FOR

281’-0” CONT. COMP. GIRDER BRIDGE

Str. No. 55-089-380

FEBRUARY 2020

4 11

DESIGNED BY:	DK. DES. BY:	DRAWN BY:
LJB	JLM	SMH

REMOVAL OF SURFACE NICKS AND GOUGES (CONTINUED)

3. The quantity provided for Surface Grinding of Structural Steel is an estimate. The payment quantity will be per square inch as determined by the Construction Engineer. This item may not be encountered and could be removed from the plans.

4. All costs associated with removing sharp edges from surface nicks and gouges including all materials, equipment and labor shall be incidental to the contract unit price per square inch for Surface Grinding of Structural Steel.

AIR CARBON ARC CUTTING AND GOUGING

1. All removal of diaphragm gusset plates and welds called for by the plans shall be accomplished using the air carbon arc process unless noted otherwise. Plasma cutting will also be allowed. If the contractor plans to use plasma cutting, the Bridge Construction Engineer shall be notified and will provide the Contractor with additional requirements for this cutting method.

2. Before any air carbon arc cutting or gouging begins, lay out all cut lines on the steel surfaces using a marker that will be visible during the cutting process.

3. When grinding to a specified shape or dimension is required after air carbon arc cutting, lay out the shape on the steel surface with a visible marker and grind to the layout line. Air carbon arc gouging shall be done using DC, electrode positive.

4. Extreme care shall be exercised during the cutting or gouging process so that absolutely no damage (such as nicks, gouges, splattering) to the surrounding metal occurs. Any damage caused by the air carbon arc process shall be repaired by the Contractor to the satisfaction of the Engineer at no cost to the Department.

5. Grind all surfaces cut or gouged with the air carbon arc process to remove high carbon deposits, provide a smooth finish, and prepare metal for welding and/or to accept paint.

PAINT RESIDUE REMOVAL AND CONTAINMENT

1. Paint removal on the existing bridge shall be in accordance with Section 412 of the Construction Specifications, except as modified by these notes.

2. The Contractor shall plan his operation to prevent releases of lead-containing material and other particulate matter into the surrounding air, water, and onto the ground, slope protection, and pavement. The Contractor shall be responsible for any corrective actions should a spill occur.

3. Collect all visible paint particles and blasting residue containing paint at the end of each workday from the work area. Inspect outside the containment and collect any paint particles or blasting residue that escaped the work area. Collect waste material by manual means, vacuum, or another method approved by the Engineer. Do not use air pressure or streaming water to assist in the waste collection process that could disperse the waste material.

4. In the event of a spill or inadvertent release, the Contractor shall immediately stop work, notify the Engineer, and report the release to the South Dakota Department of Environmental and Natural Resources (DENR). The Contractor shall be responsible for completing a spill reporting form and for all costs associated with appropriate corrective actions.

   To report a release or spill, call DENR at (605) 773-3296 during regular office hours (8 a.m. to 5 p.m., Central Time). To report the release after hours, on weekends or holidays, call State Radio Communication at (605) 773-3231. Reporting the release to DENT does not meet any obligation for reporting to other state, local, or federal agencies. Therefore, the Contractor must also contact local authorities to determine the local reporting requirements for releases. DENR recommends that spills also be reported to the National Response Center at (800) 424-8802.

BRIDGE REPAINTING, CLASS I

1. All work affected areas and all new structural steel shall be painted in accordance with Section 412 of the Construction Specifications.

2. The intent of the heat straightened & repaired areas is to paint the entire girder surface for a distance of 6" outside of the outer edges of the heat straightening. The finished girder shall have a uniform paint appearance as approved by the Engineer. For informational purposes, the approximate total area under this item of repair is 855 square feet. The actual work affected area will only be known after all the nondestructive testing and heat straightening is complete.

NOTES (CONTINUED)

FOR

281'-0" CONT. COMP. GIRDER BRIDGE

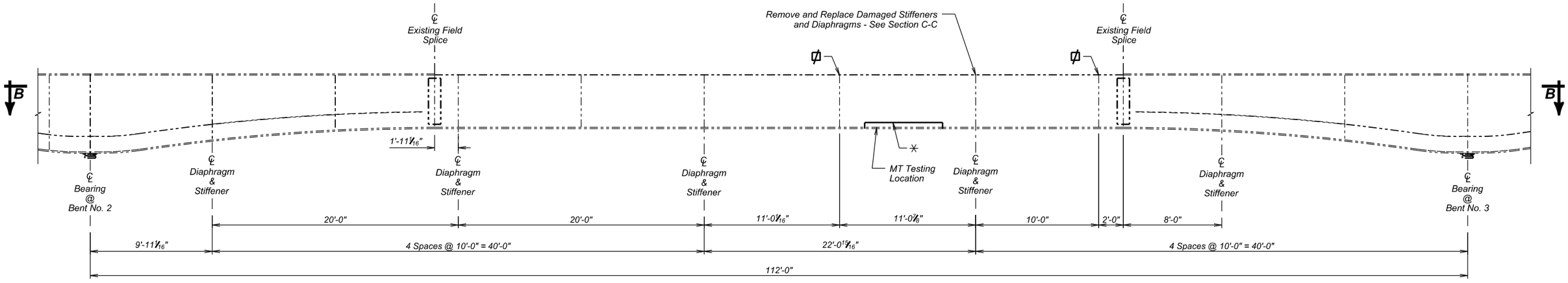
Str. No. 55-089-380

FEBRUARY 2020

5 11

DESIGNED BY:	DK. DES. BY:	DRAWN BY:
LJB	JLM	SMH

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	029S-168	14	19

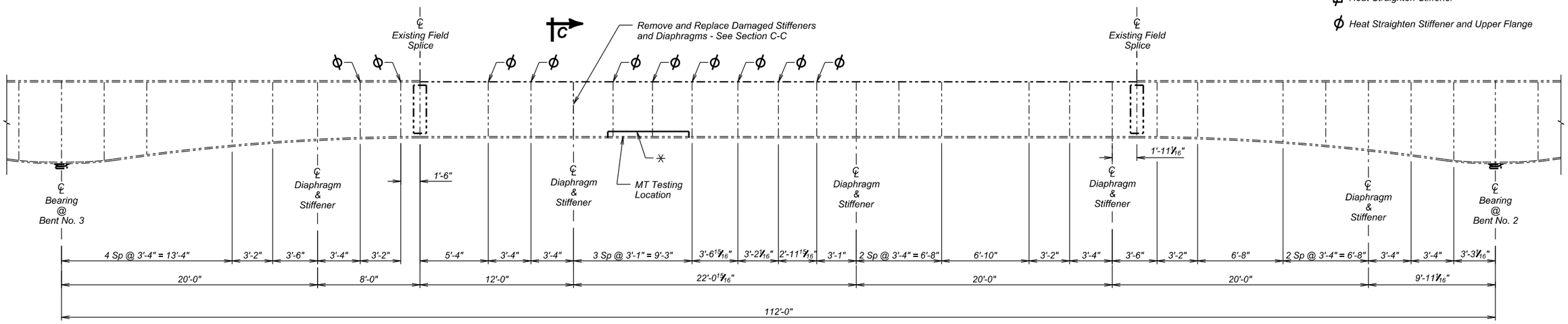


North Face of Girder No. 1

⊹ *Impact Area, Bottom Flange has been torn from Web. Rewelding of Web and Bottom Flange will be required*

Heat Straighten Stiffener

Heat Straighten Stiffener and Upper Flange



C

South Face of Girder No. 1

NOTES:

Girder web and bottom flange shall be heat straightened as necessary.

Concrete deck not shown for clarity.

Section B-B located on Sheet No. 7 of 11

Section C-C located on Sheet No. 8 of 11

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3/19/2020
SOUTH DAKOTA

(SOUTH BOUND LANES)

GIRDER NO. 1 REPAIR DETAILS

FOR

281'-0" CONT. COMP. GIRDER BRIDGE

40'- 0" ROADWAY — 48° 19' SKEW L.H.F.

OVER COUNTY ROAD 34 — SEC. 24/33-T123N-R51W

STR. NO. 55-089-380 — 029S-168

ROBERTS COUNTY

S. D. DEPT. OF TRANSPORTATION

FEBRUARY 2020

DESIGNED BY	CK. DES. BY	DRAFTED BY
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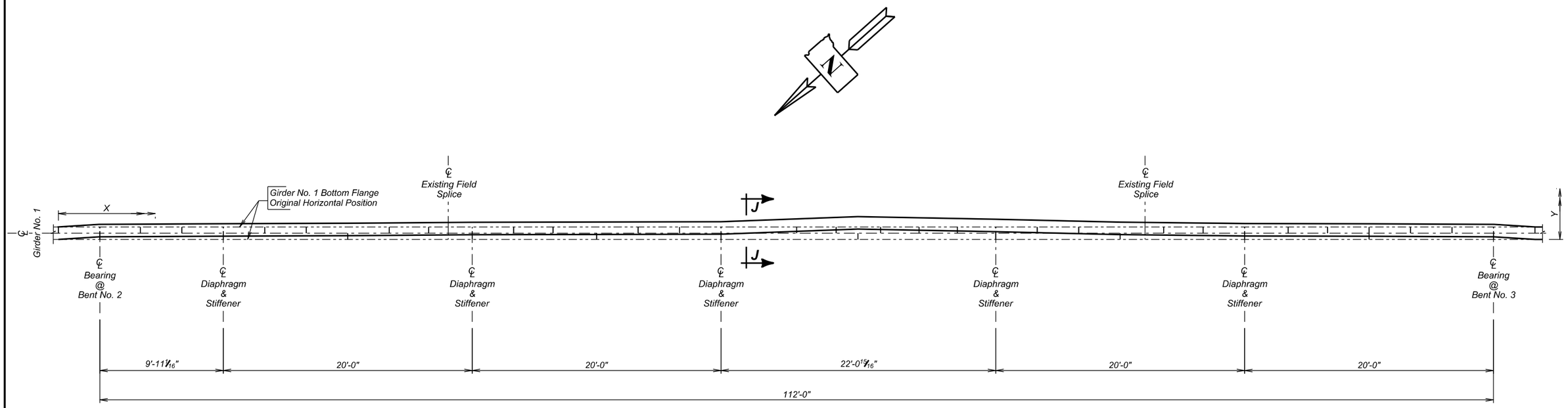
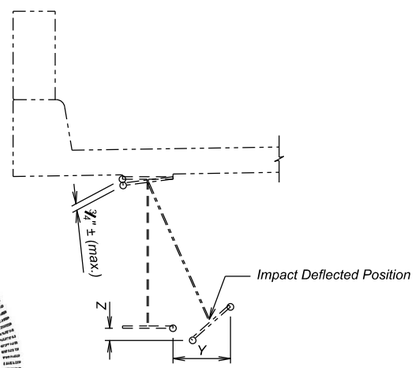
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	029S-168	15	19



SECTION B-B

GIRDER NO. 1 - BOTTOM FLANGE



SECTION J-J

(Shown at X Measurements)

GIRDER NO. 1 HORIZONTAL IMPACTS DEFLECTED POSITION MEASUREMENTS

X	Y
0'	0"
3'-4"	2 1/2"
13'-3 1/16"	3 3/8"
23'-3 1/16"	3 3/8"
33'-3 1/16"	4 1/2"
43'-3 1/16"	4 3/4"
53'-3 1/16"	5 1/4"
64'-3 1/8"	10 3/8"
75'-4"	7 1/2"
85'-4"	4 5/8"
95'-4"	3 1/4"
105'-4"	3"
115'-4"	2 1/2"
118'-8"	0"

GIRDER NO. 1 VERTICAL IMPACTS DEFLECTED POSITION MEASUREMENTS

X	Z
0'	0"
59'-4"	1/4"
62'-6 1/16"	3/8"
64'-3 1/8"	3/4"
67'-7 1/2"	8"
72'-3"	1 3/8"
75'-4"	1/2"
78'-8"	1/4"
82'-0"	1/8"
85'-4"	1/8"
88'-10"	0"

NOTE:

Heat Straighten Girder No. 1 Bottom Flange, Web, and Stiffeners. See Notes.

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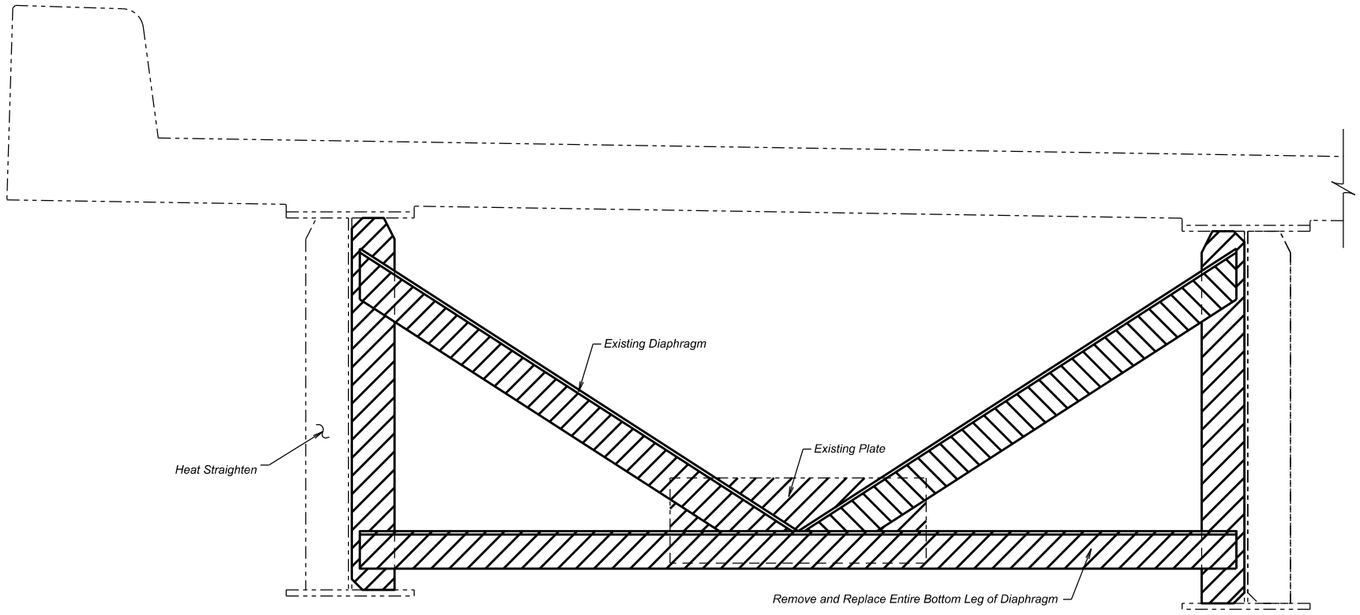
3/19/2020

(SOUTH BOUND LANES)
GIRDER NO. 1 REPAIR DETAILS (CONTINUED)
FOR
281'-0" CONT. COMP. GIRDER BRIDGE
40'- 0" ROADWAY — 48° 19' SKEW L.H.F.
OVER COUNTY ROAD 34 — SEC. 24/33-T123N-R51W
STR. NO. 55-089-380 — 029S-168

ROBERTS COUNTY
S. D. DEPT. OF TRANSPORTATION
FEBRUARY 2020

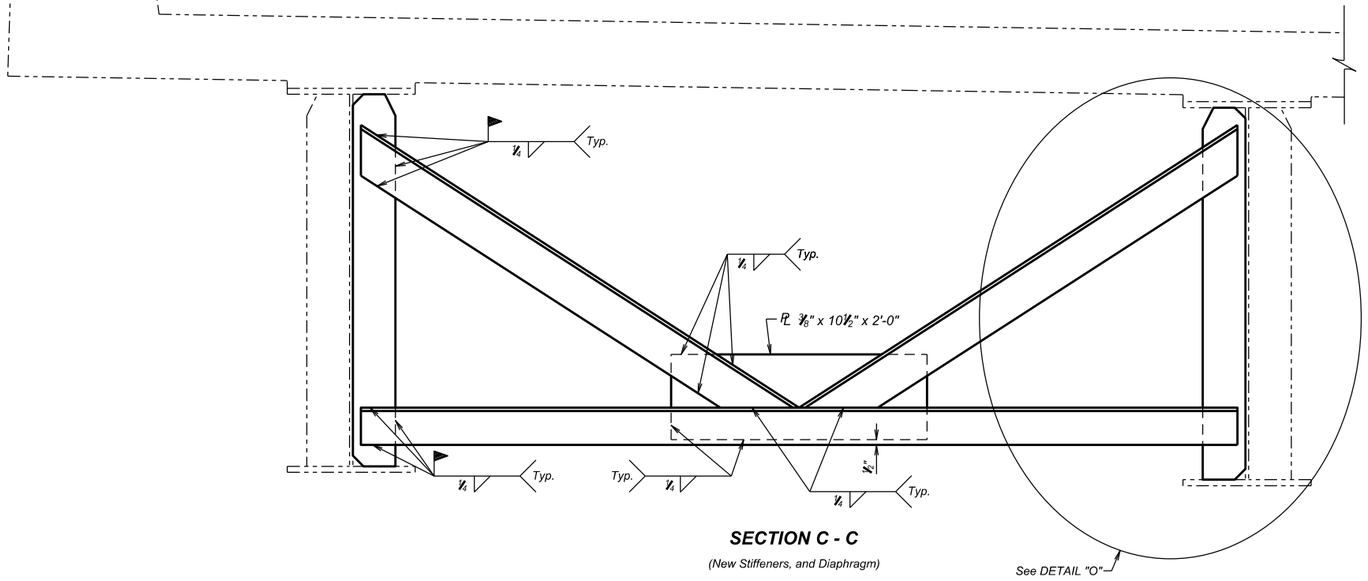
DESIGNED BY	CK. DES. BY	DRAFTED BY
LJB	JLM	SMH

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	029S-168	16	19



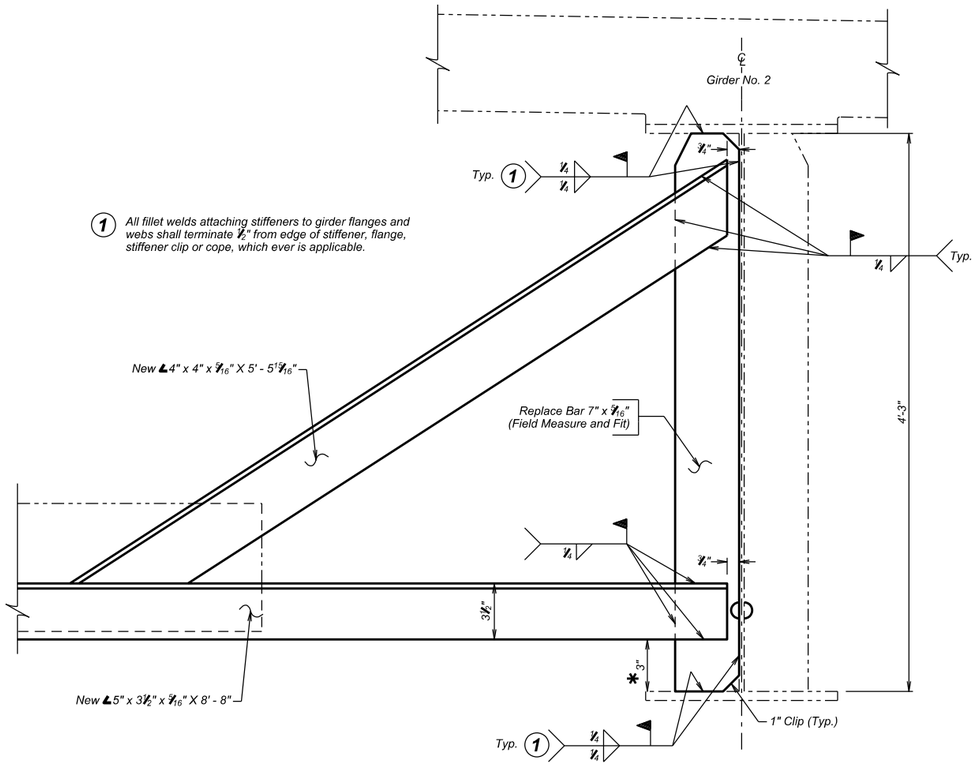
SECTION C - C

(Existing Stiffeners, and Diaphragm)



SECTION C - C

(New Stiffeners, and Diaphragm)



DETAIL "O"

* *At High Girder*

ESTIMATED QUANTITIES		
ITEM	UNIT	QUANTITY
Remove and Replace Steel Diaphragm	Each	1
Field Weld	In.	398

For information purposes only, the estimated total structural steel quantity for Remove and Replace Steel Diaphragm is 257 lbs.

REGISTERED PROFESSIONAL ENGINEER
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SOUTH DAKOTA
3/19/2020

(SOUTH BOUND LANES)

GIRDER NO. 1 REPAIR DETAILS (CONTINUED)

FOR

281'-0" CONT. COMP. GIRDER BRIDGE

40'- 0" ROADWAY — 48° 19' SKEW L.H.F.

OVER COUNTY ROAD 34 — SEC. 24/33-T123N-R51W

STR. NO. 55-089-380 — 029S-168

ROBERTS COUNTY

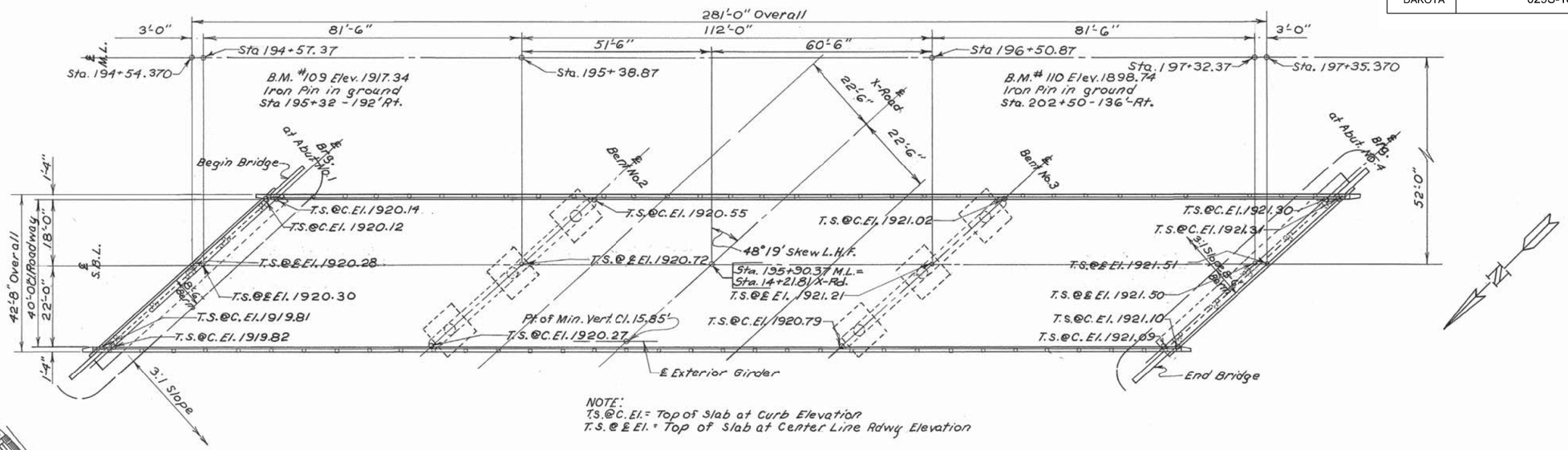
S. D. DEPT. OF TRANSPORTATION

FEBRUARY 2020

8 OF 11

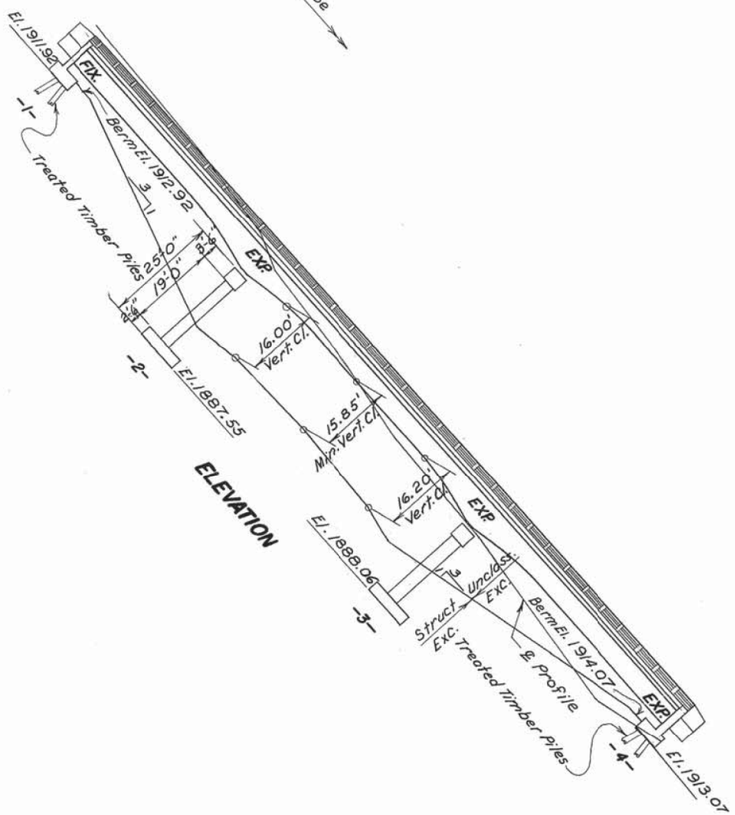
DESIGNED BY	CK. DES. BY	DRAFTED BY
LJB	JLM	SMH

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	029S-168	17	19

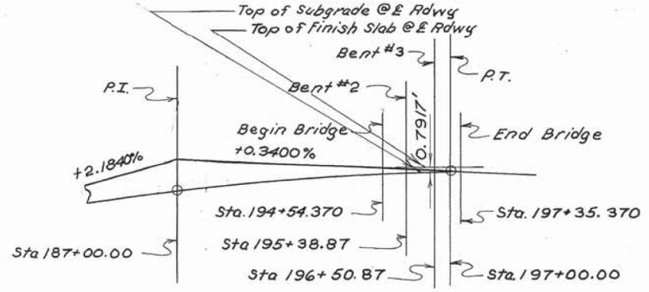


NOTE:
T.S.@C.El.= Top of Slab at Curb Elevation
T.S.@℄El. = Top of Slab at Center Line Rdwy Elevation

PLAN



ELEVATION



P.I. Sta. 187+00.00
El. 1917.20 (Subgrade)
V.C.L. 2000'

VERTICAL CURVE DATA

ORIGINAL CONSTRUCTION PLANS
STR. NO. 55-089-380
(SOUTH BOUND LANES)
GENERAL DRAWING
FOR

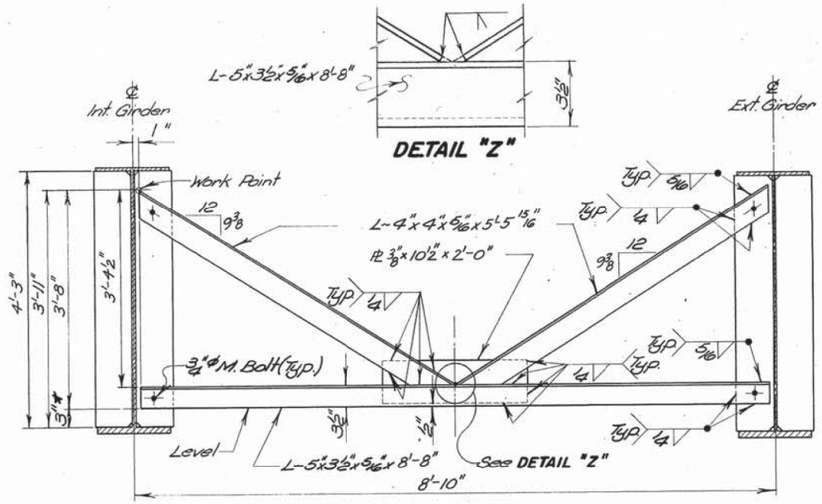
281'-0" CONT. COMP. GIRDER BRIDGE

40'-0" ROADWAY — 48°19' SKEW L.H.F.
OVER U.S. NO. 81 — SEC.24/33-T123N-R 51W
STA. 194+54.370 TO 197+35.370 — I 29-9(23)208
ROBERTS COUNTY
SOUTH DAKOTA — HS 20-44
DEPARTMENT OF HIGHWAYS (& ALT.)
SEPT. 1973 — 9 of 11

DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED
	S.H.	C.D.	BRIDGE ENGINEER

55-008

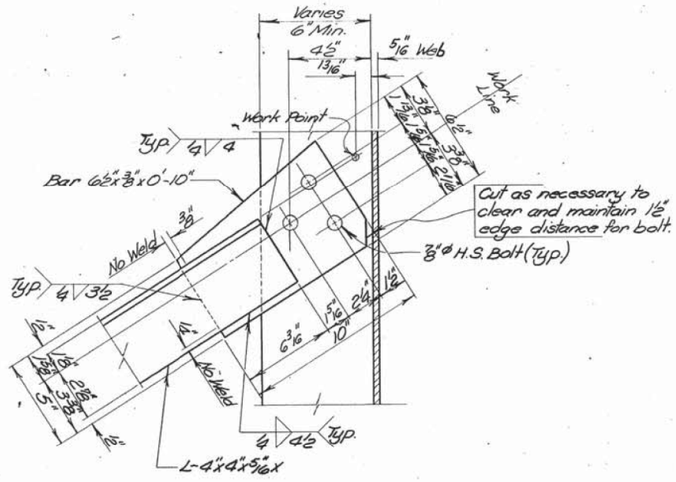
STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	029S-168	18	19



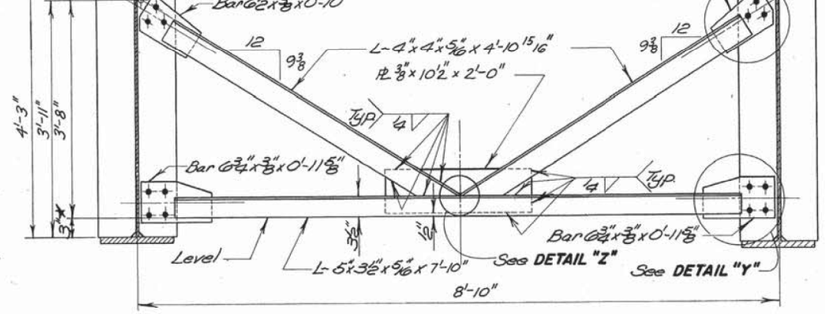
DIAPHRAGM—WELDED FIELD CONNECTION

Weight of one unit = 194 Lbs.

★3" above high girder in each bay.

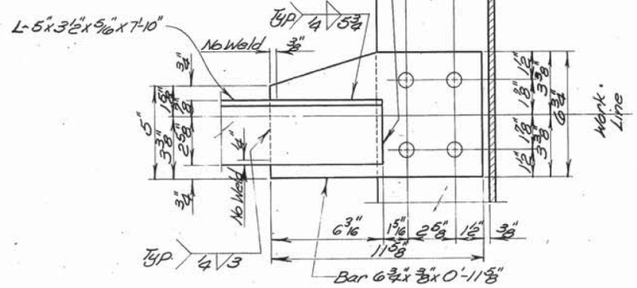


DETAIL "X"



ALTERNATE DIAPHRAGM—BOLTED FIELD CONNECTION

Weight of one unit = 219 Lbs.
(Diaphragm in Straight Section)



DETAIL "Y"

GENERAL NOTES—

1. The pay weight of structural steel for Diaphragms will be based on the weight of the Diaphragms with Welded Field Connections regardless the type furnished and installed. This includes all field bolts.
2. The ¾"ø Machine Bolts and Nuts shall conform to A.S.T.M. Specifications A-307. Machine Bolts shall have regular semi-finished hexagon heads and nuts with one round plate washer.
3. The ⅞"ø High Strength Bolts, Nuts and Washers shall conform to A.S.T.M. Specifications A325. The bolts shall be the heavy hexagon head "Structural" type with heavy semi-finished hexagon nut and hardened round washer.
4. The ⅞"ø High Strength Bolts shall be tightened to a minimum tension of 39,250 pounds. Tightening shall be done with a properly calibrated wrench or by the "turn of the nut method as provided in section 2.10.20 of the A.A.S.H.O. Specifications.
5. Holes for the ¾"ø Machine Bolts shall be 13/16"ø in the stiffener plates and 15/16"ø in the angles.
6. Holes for the ⅞"ø High Strength Bolts shall be 15/16"ø in the stiffener plates and 1 1/16"ø in the ⅝" gusset plates.

ORIGINAL CONSTRUCTION PLANS

STR. NO. 55-089-380

(SOUTH BOUND LANES)

DIAPHRAGM DETAILS

FOR

281'-0" CONT. COMP. GIRDER BRIDGE

40'-0" ROADWAY — 48°19' SKEW L.H.F.

OVER U.S. NO. 81 — SEC. 24/33-T123N-R51W

STA. 194+54.370 TO 197+35.370 — I 29-9(23)208

ROBERTS COUNTY

SOUTH DAKOTA — HS 20-44 (& ALT.)

DEPARTMENT OF HIGHWAYS

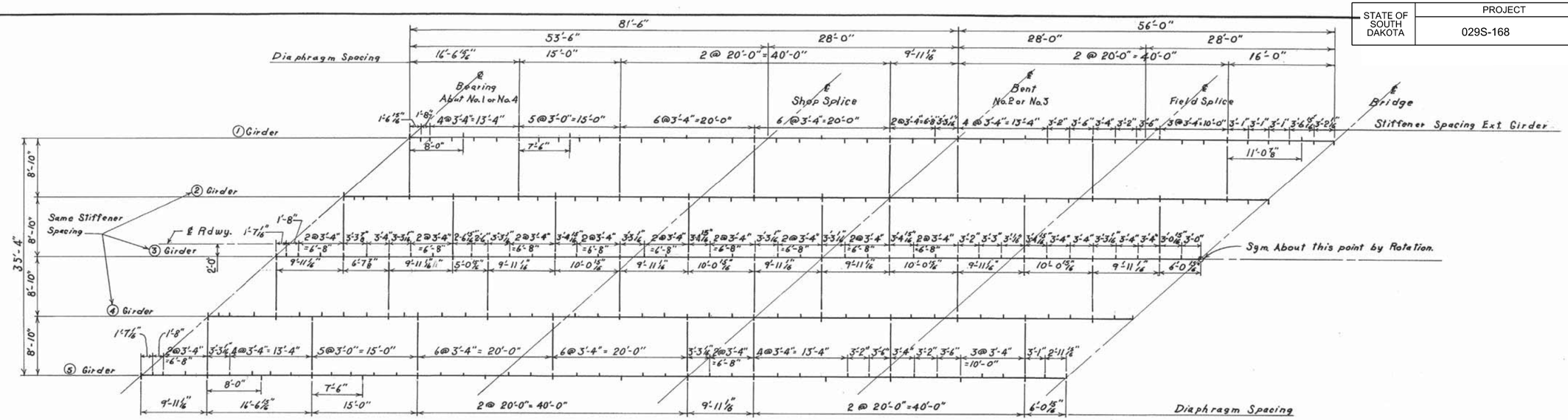
OCT. 1973

10 of 11

DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED
	E.W.J. M.C.F.	C.D.	BRIDGE ENGINEER

Master 55-008

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	029S-168	19	19



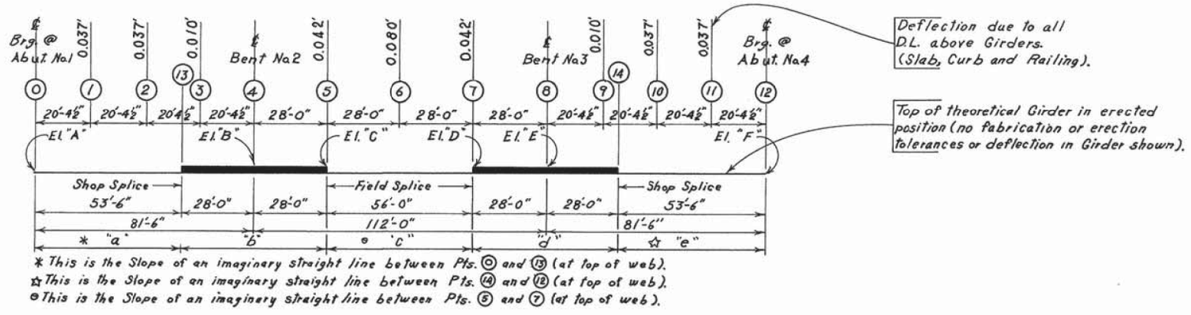
FRAMING DIAGRAM

TABLE OF SLAB FORM ELEVATIONS AND COMPUTATIONS

		0	1	2	3	4	5	6	7	8	9	10	11	12
Girder G1	Elev. "P"	1920.158	1920.305	1920.411	1920.486	1920.574	1920.744	1920.904	1920.980	1921.045	1921.128	1921.225	1921.294	1921.327
	(-) Elev. Q													
	(=) d													
	(-) 0.646'													
	(=) h													
Girder G2	Elev. "P"	1920.236	1920.384	1920.492	1920.569	1920.659	1920.832	1920.994	1921.073	1921.140	1921.226	1921.324	1921.393	1921.425
	(-) Elev. Q													
	(=) d													
	(-) 0.646'													
	(=) h													
Girder G3	Elev. "P"	1920.253	1920.403	1920.513	1920.591	1920.683	1920.859	1921.024	1921.105	1921.175	1921.262	1921.362	1921.432	1921.464
	(-) Elev. Q													
	(=) d													
	(-) 0.646'													
	(=) h													
Girder G4	Elev. "P"	1920.064	1920.216	1920.327	1920.408	1920.502	1920.680	1920.847	1920.931	1921.004	1921.092	1921.194	1921.266	1921.298
	(-) Elev. Q													
	(=) d													
	(-) 0.646'													
	(=) h													
Girder G5	Elev. "P"	1919.874	1920.028	1920.141	1920.223	1920.319	1920.500	1920.670	1920.756	1920.831	1920.922	1921.026	1921.099	1921.132
	(-) Elev. Q													
	(=) d													
	(-) 0.646'													
	(=) h													

ERECTION ELEVATIONS AND GIRDER SLOPES

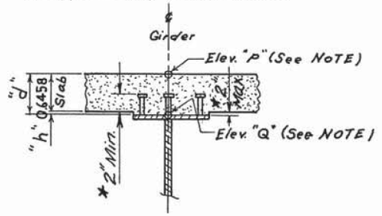
Girder No.	Elevations (Top of Girder) A	B	C	D	E	F	Slope % * "a"	"b"	⊖ "c"	"d"	☆ "e"
G 1	1919.471	1919.917	1920.049	1920.281	1920.389	1920.639	0.47153	0.47153	0.41375	0.38405	0.38405
G 2	1919.548	1920.003	1920.137	1920.375	1920.484	1920.738	0.48061	0.48061	0.42518	0.38822	0.38822
G 3	1919.565	1920.027	1920.164	1920.409	1920.519	1920.777	0.48982	0.48982	0.43661	0.39325	0.39325
G 4	1919.376	1919.845	1919.985	1920.235	1920.347	1920.610	0.49890	0.49890	0.44714	0.39963	0.39963
G 5	1919.186	1919.663	1919.805	1920.061	1920.175	1920.444	0.50810	0.50810	0.45696	0.40712	0.40712



* This is the Slope of an imaginary straight line between Pts. ⓪ and ⑬ (at top of web).
☆ This is the Slope of an imaginary straight line between Pts. ⑭ and ⑱ (at top of web).
⊖ This is the Slope of an imaginary straight line between Pts. ⑤ and ⑦ (at top of web).

ERECTION ELEVATION DIAGRAM

★ If during construction, it is found that these dimensions will be exceeded, corrective measures must be taken as approved by the ENGINEER.



NOTE—

This table of slab form elevations and computations contains the necessary information to determine the depth of concrete, in feet, over girders at the points shown. All calculations can be carried in the spaces provided. Elevations "P" is the elevation of the slab form before any concrete has been poured. This elevation includes correction for vertical curve and deflection due to all D.L. above girders. Elevation "Q" is a field measured elevation taken on top of girders at the points shown. This elevation must be taken after girder erection is completed, but prior to placing any of the concrete. Girders shall not be supported by construction shoring while elevations are taken.

ORIGINAL CONSTRUCTION PLANS

STR. NO. 55-089-380

(SOUTH BOUND LANES)

FRAMING DIAGRAM AND ERECTION DATA FOR

281'-0" CONT. COMP. GIRDER BRIDGE

40'-0" ROADWAY — 48°19' SKEW L.H.F.

OVER U.S. NO. 81 — SEC. 24/33-T123N-R51W

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ROBERTS COUNTY

SOUTH DAKOTA — HS 20-44 (8 ALT.)

DEPARTMENT OF HIGHWAYS

OCT. 1973 — 11 of 11

DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED
	F.K.	C.D.	BRIDGE ENGINEER

SHEET NO.